

## INFORMATION SHEET

ORDER NO.  
ROYAL MOUNTAIN KING MINE  
MERIDIAN BEARTRACK COMPANY  
MERIDIAN GOLD COMPANY AND  
FELIX MINING COMPANY  
CALAVERAS COUNTY

Royal Mountain King Mine (RMKM) is west of Highway 4 and south of Rock Creek Road near the town of Copperopolis, Calaveras County. RMKM was a large open pit gold mining facility operated by Meridian Gold Company. Mining facilities consist of three open pits (Gold Knoll, Skyrocket Pit, and North Pit), a mill, a Process Water Retention Pond/Leached Concentrate Residues Facility (PWP/LCRF), a Flotation Tailings Reservoir (FTR), and three overburden disposal sites (ODSs). The mining and processing of the gold ore operations commenced in February 1989 and shutdown in July 1994.

### General

Approximately 5.7 million tons of gold-bearing ore and 50 million tons of waste rock have been mined from the three pits. Mine waste at RMKM includes waste rock, flotation tailings, and leached concentrate tailings. This waste was disposed of in piles and mine waste management units (WMUs) situated on the property. The lined FTR contains approximately 5.3 million tons of flotation tailings and 750 acre-feet of associated water. The flotation tailings (solids) are classified as a Group C mining waste and the associated water (liquids) is classified as a Group B mining waste pursuant to Title 27, California Code of Regulations, Division 2, Subdivision 1 (Title 27). About 170,000 tons of leached concentrate tailings produced from milling operations are stored in the Leached Concentrate Residue Facility (LCRF), a lined surface impoundment (Group B waste management unit). A 200,000-ton pile of ore that was heap leached is situated on top of the concentrate tailings in the northern portion of the impoundment.

Analysis of historical water quality data indicates that mining activities have impacted surface water and groundwater, specifically from permitted disposal of overburden rock stockpiled on native ground and leakage through the liner at the FTR. Statistically significant increases in several constituents of concern have been detected in surface water and groundwater downgradient of each of the three ODSs. Statistically significant impacts were also detected in both groundwater and surface water at the FTR. Downgradient monitoring wells have had increases in several constituents above background concentrations and beneficial use criteria. In addition, surface water springs flows have increased in recent years as the amount of water in the FTR has increased, because of closure of the FTR Leachate Collection and Removal System. This spring water has similar concentrations as samples taken from inside the FTR, which indicates leakage from this unit.

The water level in Skyrocket Pit has risen to form a groundwater mound. The rising water level in the pit resulted in a reversal of groundwater flow direction from in toward the pit to outward from the pit during the second quarter of 1999. This reversal of

groundwater flow direction has caused increased flows and concentrations of sulfate and TDS in the Littlejohns Creek Diversion.

Surface drainage is to Littlejohns Creek, Underwood Creek, and the most northeasterly tributary of Clover Creek. Littlejohns Creek then discharges to French Camp Slough which is tributary to the San Joaquin River.

### **State Water Board Order**

On 25 April 2003, the Regional Water Board adopted Revised Cease and Desist Order (CDO) No. 5-2003-0055 to regulate the closure of the RMKM site. The three dischargers (Meridian Beartrack Company, Meridian Gold Company, and Felix Mining Company; also known as "Petitioner") subsequently petitioned the Order to the State Water Resources Control Board. On 20 May 2004, the State Water Board adopted Water Quality Order (WQO) No. 2004-0007, which vacated the Revised CDO and required the Regional Water Board and the Petitioner to consider a number of actions. These WDRs implement the findings and conclusions from this Order as follows:

1. The State Water Board found that although background water quality is variable, the Discharger's mining activities have impacted water quality, specifically in the areas downgradient of the three overburden disposal sites, Skyrocket Pit, and the Flotation Tailings Reservoir.

Finding III.A: "...although background water quality conditions are a very significant factor affecting downgradient water quality, it would not be accurate to attribute water quality conditions downgradient of the overburden disposal sites solely to background conditions or changes in rainfall patterns as proposed by Petitioners. Changes due to RMKM activities have affected the location of discharges, the timing and rate of discharges, and, in some instances, the concentration of TDS and other constituents of concern addressed in the WDRs adopted by the Regional Board. Prior to the dispute over the Revised CDO, Petitioners submitted documents to the Regional Board that recognized that RMKM operations have affected groundwater quality in the area..."

Finding III.B: "...The record establishes there are discharges of poor quality water to downgradient areas from the overburden disposal sites, the Skyrocket Pit, and the Flotation Tailings Reservoir....In addition to the natural sources of salinity and various metallic minerals, water quality has been adversely affected by large-scale mining activities....the record establishes that large-scale changes to the geology of the RMKM area due to mining operations have resulted in increased discharges of water during the dry season and increased concentrations of inorganic compounds in surface and groundwater, particularly downgradient of the overburden disposal sites at which leachate is circulated.

2. The State Water Board found that although the three overburden disposal sites are impacting water quality, it is not proper for the Regional Board to require a prescriptive Title 27 cap on these units. The units were constructed without a liner, and therefore "a

cap without the underlying liner would not isolate the mining wastes.” The State Board found that it is appropriate to consider alternative closure methods, and once they are implemented, the overburden disposal sites could be reclassified from Group B mine waste units to Group C mine waste units. Although the State Board Order highlights wetlands as an alternative closure method, the Dischargers have since determined that wetlands are not a viable method and therefore these WDRs do not address wetlands.

Finding III.C: “...The record does not support Petitioners’ contention that the groundwater surfacing at downgradient locations is unchanged by passing through the mining waste in the overburden disposal sites....Similarly, Petitioners’ contention that the overburden disposal sites do not release waste into receiving waters is not supported by the record...”

Finding III.C: “...the State Board concludes that it would be appropriate for Petitioners and the Regional Board to pursue an alternative approach” [other than capping the overburden disposal sites]...”Successful design and implementation of an alternative approach to mine closure as addressed in Section III.E. would allow for reclassification of the overburden disposal sites as Group C wastes and more effective protection of water quality.”

Finding III.E: “...In view of the high cost and limited effectiveness of installing a clay cover as a partial containment structure at the overburden disposal sites, development of a plan to improve water quality through use of enhanced and expanded wetland and riparian areas downgradient from the RMKM discharges should be given a high priority...”

Finding III.E: “...the provisions of the Title 27 regulations governing water quality and mining operations may provide sufficient flexibility for development of less costly and more effective mine closure alternatives that do not require installation of further clay covers over large areas at the RMKM site.”

Conclusion: “...California Code of Regulations title 27, section 20080(b) authorizes approval of engineered alternatives to the normally applicable prescriptive standards in instances where certain requirements are met. Thus, even if wastes at particular sites remain classified as Group B waste, the regulations may allow for alternative approaches to control of those wastes.”

3. In regard to Skyrocket Pit, the Order states that the long-term water quality threat is due to evapoconcentration of salts and other pollutants contained within the impounded water, and that potential water quality effects could be reduced by developing a drainage system that does not impound water at Skyrocket Pit. Regional Board staff has implemented this conclusion by developing an NPDES permit that will be considered for adoption at the same time as this Order.

4. The State Water Board found that it may be appropriate to consider regulatory approaches outside of Title 27 to address the impacted groundwater and surface water, including de-designation of beneficial uses and/or adoption of a groundwater

containment zone (subject to the provisions of State Water Board Resolution No. 92-49). The Order also states that a groundwater cleanup program would be very expensive and could have limited success.

Finding III.E: "...Another approach that the Petitioners previously raised...would be to amend the Basin Plan to de-designate beneficial uses of surface water and groundwater in the immediate vicinity of RMKM...if the Basin Plan were amended to de-designate beneficial uses of water...that would provide a basis for amendment of the WDRs and reclassification of the overburden disposal sites as Group C mining wastes subject to less stringent regulation..."

Finding III.E: "...Establishment of a groundwater containment zone may also be appropriate for this facility due to the high level of naturally occurring salts....In summary, a groundwater cleanup program would be extremely expensive, provide limited benefits, and could potentially aggravate groundwater conditions at some locations. For these reasons, Petitioners' proposal to establish a groundwater containment zone should be given more consideration as a partial regulatory solution for this extremely complex facility."

5. The Petitioners were ordered to prepare a plan for the development of expanded and enhanced wetland and riparian areas downgradient of the RMKM site. As stated above, the Dischargers prepared such a plan, but after consultation with Regional Water Board staff, determined that it was infeasible to implement. Instead, the Dischargers submitted a NPDES permit application, in which waters derived from the overburden disposal sites would be transferred to Skyrocket Pit. Water would be discharged from Skyrocket Pit into Littlejohn's Creek under dilution conditions prescribed by the NPDES Order. This plan substantially implements the State Water Board Order and therefore wetlands are not longer part of the overall remedial action.

6. WDRs Order No. 5-01-040 requires that wastewater collected from the Flotation Tailings Reservoir's leachate collection and recovery system (LCRS) be collected and discharged to Skyrocket Pit. However, the Discharger closed the LCRS drain plug, allowing water to back up on top of the liner. The Conclusions section of the State Water Board Order allows the Petitioner to discharge wastewater to Skyrocket Pit, but states that the "Regional Board shall not institute enforcement action to require transfer of water from the FTR/LCRS to Skyrocket Pit prior to revision of the closure WDRs...". The Discharger did not resume discharge to Skyrocket Pit, and as described in the Order, Regional Board staff's review of the data shows that wastewater from the FTR appears to be surfacing in Love Pond Spring. These WDRs require that the Discharger either show that the Love Pond Spring does not contain wastewater or that the water be collected and transferred to Skyrocket Pit (either by opening the LCRS valve or collected the water directly from the spring).

7. The Regional Water Board was ordered to revise the mine closure WDRs upon receipt of the Petitioners' plan for addressing the various outstanding issues. These WDRs implement the State Water Board Order by rescinding and replacing Closure WDRs Order No. 5-01-040.

## Closure

These closure WDRs implement the State Water Board Order but do not address final closure of the entire RMKM site. Several of the units have been closed or have closure plans in place, as described below. Other units either have proposed studies to verify their models are accurate, or the WDRs request plans for closure. In addition, the WDRs require plans and a timeline for addressing groundwater impacts. The overall site closure will be the combination of the closures of the individual units, and the site-wide corrective actions for surface water and groundwater impacts. The paragraphs below discuss each individual waste management unit and the closure status.

Flotation Tailings Reservoir (FTR): The FTR was previously closed as a Group C WMU because of the classification of the solids. During closure, the WMU was regraded to divert stormwater runoff, and then covered with a thin layer of topsoil and vegetated. The approved closure plan stated that the unit's Leachate Collection and Recovery System (LCRS) was to remain open to drain any water that ponded upon the FTR's liner. This would prevent head from increasing on the liner, keeping the discharge of Group B mining wastewater through the liner system at a minimum. However, the Discharger closed the LCRS in 2003, in violation of their WDRs and inconsistent with the closure plan. In addition, the Discharger plugged the spine drains, which were installed to remove clean groundwater below the FTR liner. The FTR currently contains 750 acre-feet of Group B mining wastewater, which is applying approximately 50 feet of head on the liner system. This amount of head will push significant amounts of wastewater through the liner system, compared to a drained unit. Staff's evaluation of the data shows that wastewater from the FTR is surfacing in Love Pond Spring, resulting in a discharge to Littlejohn's Creek. These WDRs require the Discharger either show that the Love Pond Spring does not contain wastewater or that the water be collected and transferred to Skyrocket Pit (either by opening the LCRS valve or collected the water directly from the spring).

Leached Concentrate Residue Facility (LCRF): The Discharger has closed the LCRF in accordance with the previous WDRs and Title 27. Staff verified that the final closure was acceptable in a letter dated 28 July 2005. The closure cover consisted of (from top to bottom) a 6-inch thick vegetative soil cover, a one-foot thick FTR tailings layer, a geocomposite drainage layer and a foundation layer. The LCRF was graded to drain storm water from the unit.

Process Wastewater Pond (PWP): WDRs Order No. 5-2001-0040 implemented the Discharger's previous proposal to clean close this unit; however, the work had not yet taken place at the time these WDRs were being updated. As part of its RWD, the Discharger requested that the PWP be closed in-place instead. The Discharger has recently submitted several documents, which include the closure plan and a study showing that clean closure is infeasible per Title 27. These WDRs require the Discharger to close the unit in place, and allow the process to take place under the Discharger's proposed ten year timeframe. Closure will consist of a cover that consists of (from top to bottom) a vegetative layer, geocomposite drainage layer, a 60-mil high-

density polyethylene (HDPE) as the low-hydraulic-conductivity layer and a foundation layer.

Skyrocket Pit: The excavated Skyrocket Pit has filled with a combination of naturally occurring groundwater, wastewater transferred from the FTR and FTR LCRS, and wastewater from the ODSs. As the Skyrocket Pit water level rose above the elevation of the creek bed, a dam was constructed on Littlejohns Creek to contain the wastewater. The dam was raised a second time as the water level continued to rise. Because the water levels rose above Littlejohns Diversion creek bed level (a diversion of Littlejohns Creek around Skyrocket Pit), springs occurred that contained water from Skyrocket Pit. In order to mitigate this on-going discharge, the water in Skyrocket Pit must be lowered to a level below the creek bed. This lowering of Skyrocket Pit is required in these WDRs, and will be accomplished through discharges permitted in the companion NPDES Order. Final closure of Skyrocket Pit is not required in these WDRs; however, the Discharger is required to complete further studies and submit a closure plan or corrective action plan.

Overburden Disposal Sites (ODS): The three ODSs are classified as Group B mining waste based on high levels of dissolved solids in wastewater. Final closures of these units are not included in these WDRs. As discussed above, the State Water Board Order found that the Title 27 prescriptive standard for closure was infeasible. However, the Order found that an engineered alternatives to the prescriptive standard could be proposed, if the discharger demonstrates that the alternatives meets the performance standards of Title 27. These WDRs do not require that the ODSs be capped (i.e., the prescriptive standard), but instead require an engineered alternative for closure. It is anticipated that the engineered alternative will incorporate the transfer of wastewater to Skyrocket Pit to mitigate surface water impacts, and either a containment zone or a de-designation of beneficial uses to mitigate groundwater impacts.

Final Site-Wide Closure: Final site-wide closure will include the individual unit closures plus corrective action of any groundwater and surface water quality degradation from those units. As required in these WDRs, studies and plans will be submitted that will include engineered alternatives to Title 27 as well as a feasibility study, including options for site wide closure and clean up. Engineered alternatives shall include why the prescriptive standard is infeasible and how the alternative meets the performance standards of Title 27. Other regulatory measures can and probably will be used to meet the performance standards of Title 27 (SWRCB Resolution 92-49 Containment Zone or Basin Plan Amendment to designate groundwater).

## **Conclusion**

Mining at RMKM between 1989 and 1994 has impacted groundwater and surface water. Seven mining waste management units exist at this facility, with one unit that has a completed final closure and another with approval of a closure plan in these WDRs. A comprehensive site wide closure plan is required by these WDRs, which will include individual unit closures in a comprehensive site wide plan. This plan may include other regulatory considerations in any engineered alternative evaluation.

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1-Oct-07: VJI/WSW

Tentative